

Acoustic radiation force impulse (ARFI) imaging of preliminary mucosa associated lymphoid tissue (MALT) lymphoma in the breast: a case report

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Abstract: Primary lymphoma is a rare neoplasm in the breast accounting for between 0.04% and 0.5% of all malignant mammary tumors. The majority of cases lack typical features of breast malignancy or lymphoma, and likely to be misdiagnosed during daily clinical practice. In this report we describe a case of primary breast lymphoma assessed with acoustic radiation force impulse (ARFI) technology.

Keywords: Acoustic radiation force impulse (ARFI); mucosa associated lymphoid tissue lymphoma (MALT lymphoma); breast



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A 45-year old woman had a history of right breast mass for 11 years and increased quickly in size for several months without other symptoms. She had undergone partial breast neoplasm resection and the pathology result was considered benign, but the result details were not remembered by the patient. Physical examination revealed an irregular, rubbery, moveable, palpable neoplasm with the size of 4 cm × 4 cm in the right breast upper outer quadrant, and a three centimeter postsurgical scar beside the breast neoplasm without nipple or skin retraction. The ultrasound machine used was Siemens S2000 (Siemens Medical Solutions, USA) equipped with a linear array transducer with a bandwidth of 4-9 MHz. Sonographic examination revealed the presence of irregular hypoechoic solid mass containing cystic component located in right breast at 11 o'clock (*Figures 1,2*) (*Video 1*). The distance of the tumor lower margin from the nipple was 0.5 cm. Color Doppler sonography showed abundant blood flow signals within and around the mass (*Figure 3*) (*Video 2*). Doppler spectrum demonstrates a high velocity (22.6 cm/s) and moderate resistance index (RI) = 0.58 (*Figure 4*).

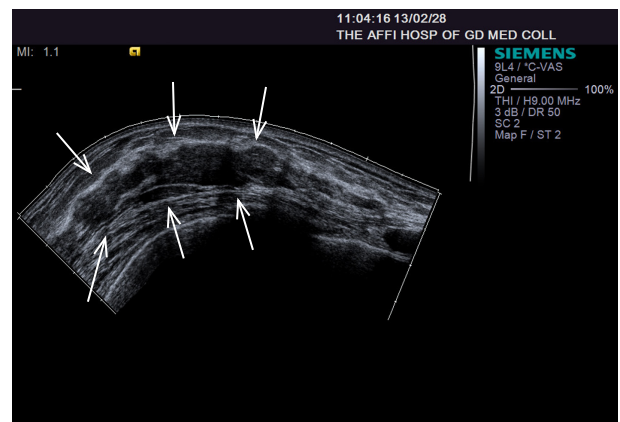


Figure 1 Panoramic ultrasound imaging for a 47-year old woman shows a solid hypoechoic mass with a lobular and heterogeneous echogenicity within the mammary-glandular layer of the breast.

Virtual Touch application consists of Virtual Touch tissue imaging (VTI) and Virtual Touch tissue quantification (VTQ), which refers to quantitative assessment of the

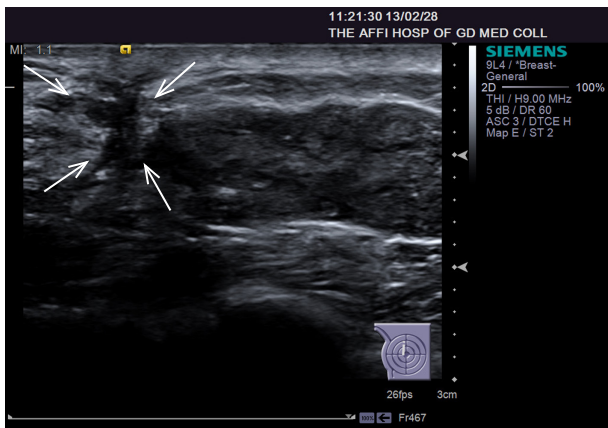


Figure 2 Ultrasound image of an irregular, hypoechoic, postsurgical breast scar (white arrow) adjacent to the mass.



Video 1 An irregular, hypoechoic solid mass with cystic component located in the right breast upper outer quadrant.

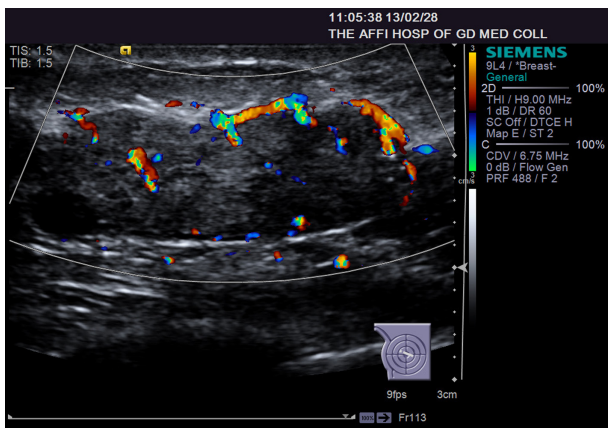


Figure 3 Ultrasound image of increased vascularity around and within the mass.



Video 2 Marked vascularity around and within the mass.

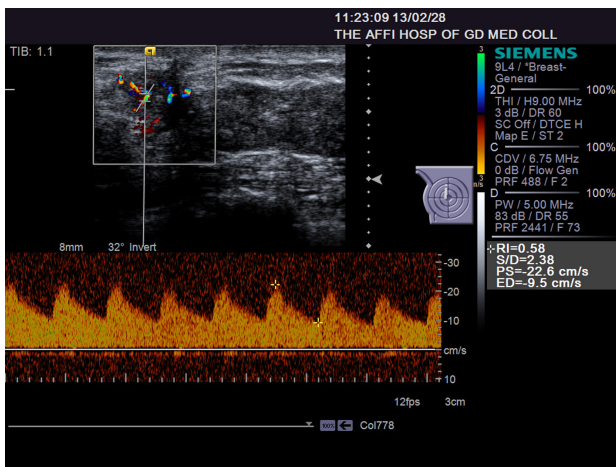


Figure 4 Doppler spectrum demonstrates a high velocity (22.6 cm/s) and moderate resistance index (RI) = 0.58.

tissue stiffness property of the shear wave velocity (SWV) generated by the displacement of tissue. VTI showed a dark region (harder) surrounded by more compliant normal breast parenchyma (Figure 5). A region of interest (ROI) with a fixed dimension of 5 mm × 5 mm was performed on B-mode ultrasound images to get VTQ by the measurement of SWV. The SWV was measured seven times at predetermined sites in the mass and parenchyma of the mammary gland. With removal of the highest and the lowest values, the mean value of the five measurements was defined as the value of the SWV (measured in m/s) for this evaluation. The mean shear wave velocities in the mass and the mammary gland parenchyma were 2.78 and 1.03 m/s (Figure 6A,B), respectively. Breast Imaging-Reporting and Data System category was 4B. Pre-operative chest radiographs and abdominal ultrasound did not show

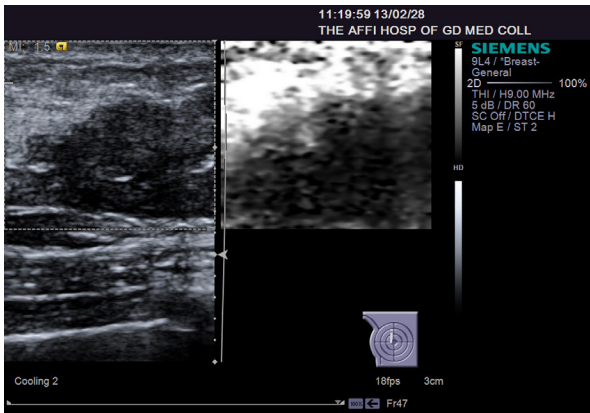


Figure 5 The mass appears slightly hypoechoic in B-mode image and in the ARFI image as a dark region (harder) surrounded by more compliant normal breast parenchyma (softer). Abbreviation: ARFI, acoustic radiation force impulse.

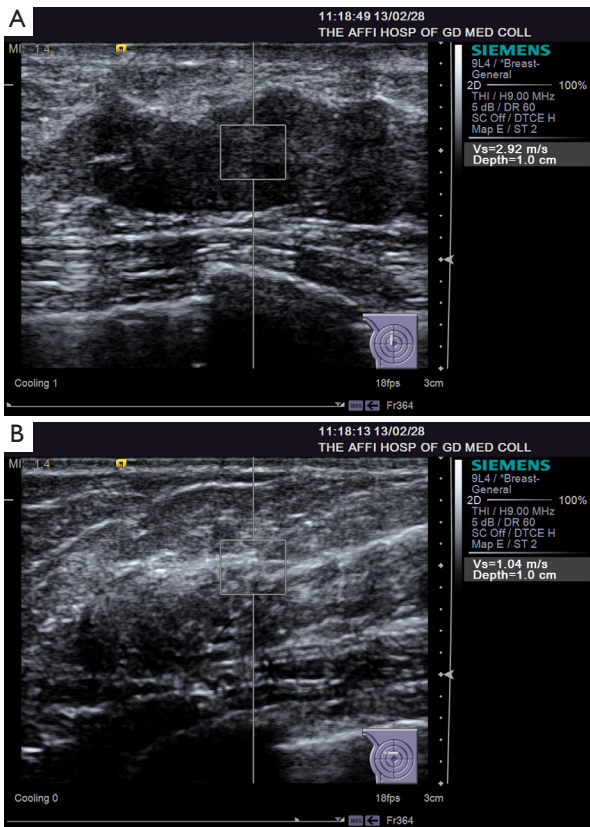


Figure 6 (A) Shear wave velocity is 2.92 m/s in the mass; (B) Shear wave velocity is 1.04 m/s in the mammary parenchyma.

evidence of other abnormality. Postoperative pathologic diagnosis was mucosa associated lymphoid tissue (MALT) lymphoma (Figure 7). Immunohistochemical stains for

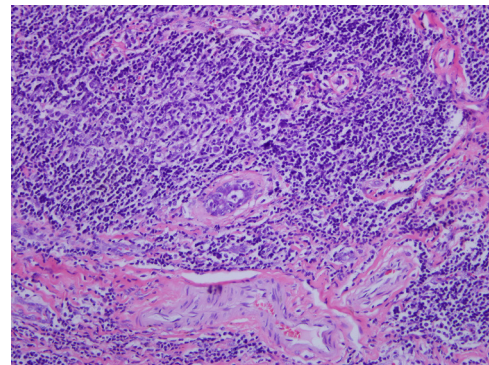


Figure 7 Hematoxylin and eosin stain of surgical specimen of the right breast mass shows a multitude of small lymphocytes in the tissue. Pathology demonstrates mucosa associated lymphoma MALT lymphoma (20x).

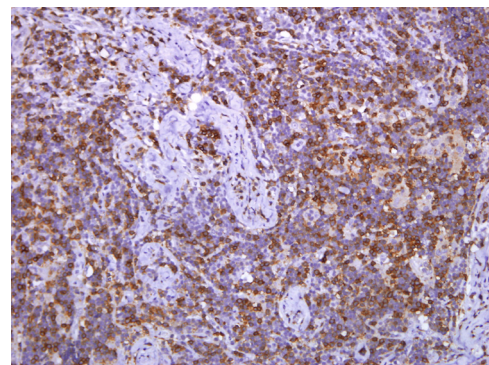


Figure 8 Immunohistochemical staining for CD-5 was diffusely positive (brown being positive and blue being negative) (20x).

CD5 (Figure 8), CD79a, CD20, CD23, CD21, Vimentin, Bcl-2 were positive, immunohistochemical stains for TdT, CD45RO, CD3, BCL-6, CK were negative. Both VTI and VTQ showed lymphoma was consistent with stiffer features than that of mammary parenchyma.

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